

Response To Final Office Action Mailed December 10, 2002

A. Pending Claims

Claims 2270-2308, 5396-5428, 5430-5439, and 5467-5476 are pending in the case. Claims 2274, 2275, 5403, 5404, and 5449-5466 are withdrawn from consideration. Claims 5429 and 5440-5466 have been cancelled. Claims 2273-2276, 2279, 2281, 2303, 2304, 5397-5399, 5402-5406, 5409, 5411, 5427, 5428, 5431, 5433, 5434, and 5437 have been amended. Claims 5467-5476 are new.

B. Restriction of Claims

In item 3 of the Office Action, the Examiner states: "Newly submitted claims 5449-5466 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: They are considered to comprise, in conjunction with the claims already pending, subcombinations, usable together, insofar as the new claims could be practiced in a process not requiring the porosity to increase in a uniform manner, as evidenced by new claims 5449, 5451-5458 and 5460-5466.... Accordingly, claims 5449-5466 stand withdrawn from consideration as being directed to a non-elected invention." Applicant respectfully disagrees with the necessity of the restriction; however, to expedite prosecution, claims 5449-5466 have been cancelled.

In item 4 of the Office Action, the Examiner states: "Newly submitted claims 5403 and 5404 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: They correspond to species of heaters, non-elected in the previous Office action.... Accordingly, claims 5403 and 5404 stand withdrawn from consideration as being directed to a non-elected invention." Claims 5403 and 5404 stand withdrawn from consideration. Applicant reserves the right for consideration of claims to additional species written in dependent form upon allowance of a generic claim.

C. The Claims Are Definite Pursuant To 35 U.S.C. § 112, Second Paragraph

Claims 5398, 5399, 5447, and 5448 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has amended claims 5398 and 5399 for clarification. Claims 5447 and 5448 have been cancelled. Applicant respectfully requests removal of the indefiniteness rejection of the claims.

D. Provisional Double Patenting Rejection

The Examiner provisionally rejected claims 2270-2308 and 5396-5448 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2270-2308 of copending U.S. Patent Application No. 09/841,284. Applicant respectfully disagrees that the claims of these applications would raise double patenting issues. However, to expedite prosecution, a terminal disclaimer is being sent to the Examiner in a separate document.

E. The Claims Are Not Anticipated by Sresty pursuant to 35 U.S.C. § 102(b); The Claims Are Not Obvious Over Sresty Pursuant To 35 U.S.C. § 103(a)

The Examiner rejected claims 2270-2273, 2277, 2279, 2282-2295, 2303-2305, 5397-5402, 5407, 5409, 5412-5425, 5433-5435 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,485,869 to Sresty et al. (hereinafter "Sresty") or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Sresty. Applicant respectfully disagrees with these rejections.

The standard for "anticipation" is one of fairly strict identity. To anticipate a claim of a patent, a single prior source must contain all the claimed essential elements. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q.81, 91 (Fed.Cir. 1986); *In re Donahue*, 766 F.2d 531, 226 U.S.P.Q. 619, 621 (Fed.Cir. 1985).

In order to reject a claim as obvious, the Examiner has the burden of establishing a *prima facie* case of obviousness. *In re Warner et al.*, 379 F.2d 1011, 154 USPQ 173, 177-178 (CCPA 1967). To establish a *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP § 2143.03.

Claim 2270 describes a combination of features including: “allowing the heat to transfer from the one or more heaters to a selected section of the formation....” The above-quoted features, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

Claim 5397 describes a combination of features including: “allowing the heat to transfer from the one or more heaters to a part of the formation....” The above-quoted features, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

Sresty discloses: “Thus, in accordance with the present invention, the formations are heated substantially uniformly with electromagnetic power to temperatures of 250° C. to 275° C.” (Sresty, column 3, lines 53-56) Sresty further discloses:

The zone 28 heated by applied energy is approximately that bounded by the electrodes 12, 16. The electrodes 12, 14, 16 of the waveguide structure 6 provide an effective confining waveguide structure for the alternating electric fields established by the electromagnetic excitation. The outer electrodes 12, 16 are commonly referred to as the ground or guard electrodes, the center electrodes 14 being commonly referred to as the excitor electrodes. (Sresty, column 5, lines 56-64)

Sresty appears to teach heating the formation by applying electromagnetic energy to a zone of the formation to be heated. The electromagnetic energy is applied to the zone of the formation using electrodes placed at the boundaries of the zone. The electromagnetic energy applied using the electrodes then heats the zone of the formation bounded by the electrodes.

Sresty does not appear to teach or suggest at least the feature of “allowing the heat to transfer from the one or more heaters to a selected section of the formation” (emphasis added). Similarly, Sresty does not appear to teach or suggest at least the feature of “allowing the heat to transfer from the one or more heaters to a part of the formation” (emphasis added). Applicant respectfully requests removal of the obviousness rejection of claims 2270, 5397, and the claims dependent thereon.

Applicant submits that many of the claims dependent on claims 2270 and 5397 are separately patentable.

Claim 2271 describes a combination of features including: “wherein the one or more heaters comprise at least two heaters, and wherein superposition of heat from at least two heaters pyrolyzes at least some hydrocarbons within the selected section of the formation.” Claim 5400 describes a combination of features including: “wherein the one or more heaters comprise at least two heaters, and wherein superposition of heat from at least two heaters pyrolyzes at least some hydrocarbons within the part of the formation.” Applicant submits at least the above-quoted features of the claims, in combination with other features of the claims, do not appear to be taught or suggested by the cited art. As described above, Sresty appears to teach heating a zone in the formation with electromagnetic energy applied using electrodes placed at the boundaries of the zone. Accordingly, superposition of heat would not inherently occur.

Claim 2272 describes a combination of features including: “maintaining a temperature within the selected section within a pyrolysis temperature range, wherein the pyrolysis temperature range is from about 250 °C to about 370 °C.” Applicant submits at least the above-quoted features of the claim, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

Amended claim 5398 describes a combination of features including: “wherein the heat is allowed to transfer from the one or more heaters to at least a portion of the part to establish a pyrolysis zone in the part of the formation.” Applicant submits at least the above-quoted features

of the claim, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

Claims 2304 describes a combination of features including: “wherein allowing the heat to transfer increases a permeability of a majority of the selected section such that the permeability of the majority of the selected section is substantially uniform.” Applicant submits at least the above-quoted features of the claim, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

Claim 5434 describes a combination of features including: “wherein allowing the heat to transfer increases a permeability of a majority of the part such that the permeability of the majority of the part is substantially uniform.” Applicant submits at least the above-quoted features of the claim, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

F. The Claims Are Not Obvious Over Sresty Pursuant To 35 U.S.C. § 103(a)

The Examiner rejected claims 2281, 2296, 5411, 5426, and 5440-5448 under 35 U.S.C. § 103(a) as unpatentable over Sresty. Applicant respectfully disagrees with these rejections.

Amended claim 2281 describes a combination of features including: “wherein allowing the heat to transfer to the selected section of the formation heats the selected section to increase a thermal conductivity of at least a portion of the selected section to greater than about 0.5 W/(m °C).” Applicant submits at least the above-quoted features of the claim, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

Amended claim 5411 describes a combination of features including: “wherein allowing the heat to transfer to the part of the formation heats the part to increase a thermal conductivity of at least a portion of the part to greater than about 0.5 W/(m °C).” Applicant submits at least the above-quoted features of the claim, in combination with other features of the claim, do not

appear to be taught or suggested by the cited art. Applicant submits that it is not an obvious matter of choice or design “to increase a thermal conductivity of at least a portion of the part to greater than about 0.5 W/(m °C).”

Claim 2296 describes a combination of features including: “controlling a pressure within at least a majority of the selected section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.” Applicant submits at least the above-quoted features of the claim, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

Claim 5426 describes a combination of features including: “controlling a pressure within at least a majority of the part of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.” Applicant submits at least the above-quoted features of the claim, in combination with other features of the claim, do not appear to be taught or suggested by the cited art.

G. Claim 5429 Has Been Substantially Rewritten in Independent Form

In the Office Action, the Examiner stated that claim 5429 has been rejected only on the grounds of double patenting and/or 35 U.S.C. § 112, second paragraph.

New claim 5467 and the claims dependent thereon (claims 5468-5476) now include features from claims 5397 and 5429 substantially rewritten in independent form. As such, Applicant submits that claim 5467 and the claims dependent thereon are in condition for allowance.

H. Summary

Applicant submits that all claims are in condition for allowance. Favorable consideration is respectfully requested.

It is believed that no fees are due in association with the filing of this and accompanying documents. If any extension of time is required, Applicant hereby requests the appropriate extension of time. If any fees are required, please charge those fees to Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C. Deposit Account Number 50-1505/5659-02500/EBM.

Respectfully submitted,

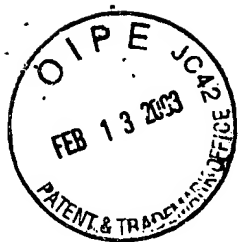


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Marked-Up Version of Amendments Submitted With
Amendment; Response to Final Office Action Mailed December 10, 2002

In the Claims:

2273. (amended) The method of claim 2270, wherein at least one of the one or more heaters comprises an electrical heaters.

2274. (amended) The method of claim 2270, wherein at least one of the one or more heaters comprises a surface burners.

2275. (amended) The method of claim 2270, wherein at least one of the one or more heaters comprises a flameless distributed combustors.

2276. (amended) The method of claim 2270, wherein at least one of the one or more heaters comprises a natural distributed combustors.

2279. (amended) The method of claim 2270, wherein providing heat from the one or more heaters to at least the portion of the formation comprises:

heating a selected volume (∇V) of the hydrocarbon containing formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day (Pwr) provided to the selected volume is equal to or less than $h * V * C_v * \rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

2281. (amended) The method of claim 2270, wherein allowing the heat to transfer to the selected section of the formation heats ~~providing heat from the one or more heaters comprises heating the selected section such that to increase~~ a thermal conductivity of at least a portion of the selected section is to greater than about 0.5 W/(m °C).

2303. (amended) The method of claim 2270, wherein allowing the heat to transfer ~~comprises~~ increasing ~~increases~~ a permeability of a majority of the selected section to greater than about 100 millidarcy.

2304. (amended) The method of claim 2270, wherein allowing the heat to transfer increases ~~further comprising substantially uniformly increasing~~ a permeability of a majority of the selected section such that the permeability of the majority of the selected section is substantially uniform.

5397. (amended) A method of treating a hydrocarbon containing formation in situ, comprising:
providing heat from one or more heaters to at least a portion of the formation; and
allowing the heat to transfer from the one or more heaters to a part of the formation such that a porosity of a majority of the part increases substantially uniformly.

5398. (amended) The method of claim 5397, wherein the heat is allowed to transfer from the one or more heaters to at least a portion of the part ~~comprises to establish~~ a pyrolysis zone in the part of the formation.

5399. (amended) The method of claim 5397, wherein the heat is allowed to transfer from the one or more heaters to at least a portion of the part ~~comprises to establish~~ a pyrolysis zone proximate to and/or surrounding at least one heater in the part of the formation.

5402. (amended) The method of claim 5397, wherein at least one of the one or more heaters comprises an electrical heaters.

5403. (amended) The method of claim 5397, wherein at least one of the one or more heaters comprises a surface burners.

5404. (amended) The method of claim 5397, wherein at least one of the one or more heaters comprises a flameless distributed combustors.

5405. (amended) The method of claim 5397, wherein at least one of the one or more heaters comprises a natural distributed combustors.

5406. (amended) The method of claim 5397, wherein at least one of the one or more heaters comprises a natural distributed combustors, the method further comprising allowing oxidizing fluid to react with at least some hydrocarbons within a reaction zone to generate heat in the reaction zone and transferring the generated heat substantially by conduction from the reaction zone to the part.

5409. (amended) The method of claim 5397, wherein providing heat from the one or more heaters to at least the portion of the formation comprises:

heating a selected volume (V) of the hydrocarbon containing formation from the one or more heat sources, wherein the formation has an average heat capacity (C_v), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day (P_{wr}) provided to the selected volume is equal to or less than $h \cdot V \cdot C_v \cdot \rho_B$, wherein ρ_B is formation bulk density, and wherein an average heating rate (h) of the selected volume is about 10 °C/day.

5411. (amended) The method of claim 5397, wherein allowing the heat to transfer to the part of the formation heats ~~providing heat from the one or more heaters comprises heating the part such that to increase~~ a thermal conductivity of at least a portion of the part ~~is to~~ greater than about 0.5 W/(m °C).

5427. (amended) The method of claim 5397, further comprising controlling formation conditions to produce a mixture from the formation, wherein a partial pressure of H₂ ~~H₂~~ within the mixture is greater than about 0.5 bar.

5428. (amended) The method of claim 5397, further comprising producing a mixture from the formation, wherein a partial pressure of H₂ ~~H₂~~ within the mixture is measured when the mixture is at a production well.

5431. (amended) The method of claim 5397, further comprising:

providing hydrogen (H_2) to the heated section to hydrogenate hydrocarbons within the section; and

heating a portion of the section with heat from hydrogenation.

5433. (amended) The method of claim 5397, wherein allowing the heat to transfer ~~comprises~~ increasing a permeability of a majority of the part to greater than about 100 millidarcy.

5434. (amended) The method of claim 5397, wherein allowing the heat to transfer increases ~~further comprising substantially uniformly increasing~~ a permeability of a majority of the part such that the permeability of the majority of the part is substantially uniform.

5437. (amended) The method of claim ~~5423~~ 5436, wherein at least about 20 heaters are disposed in the formation for each production well.